

REMARKS

Claim 1 has been amended to more particularly define Applicant's claimed invention. Basis for the amendment of claim 1 can be found at page 8, lines 9-26 of Applicant's specification. Claim 21 has been amended to more particularly define Applicant's claimed invention as suggested by the Examiner. Basis for the amendment of claim 21 can be found at original claims 1 and 2.

The rejection of claim 21 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention is respectfully traversed.

In view of the amendment of claim 21, this rejection is deemed improper and should be withdrawn.

The rejection of claims 1-13, 21 and 22 under 35 U.S.C. 103(a) as being unpatentable over Zurecki et al. (US 5,738,281) in view of Nowotarski et al. (US 5,486,383) and the admitted state of the prior art is respectfully traversed.

In view of the amendment of claim 1 and the arguments below, this rejection is deemed improper and should be withdrawn.

Gas shields known in the art are used to prevent or reduce the oxidation of reactive materials such as metals during deposition. It would be thought by those skilled in the art to be nonsensical to use such a shield when spraying a material not sensitive to oxidation or nitridation as claimed by Applicant. Applicant has found, however, that there are additional benefits to be gained using such a shield. Applicant has discovered that when using such a shield the temperature of the thermal spray effluent is substantially higher close to the thermal spray device and the rate of temperature decline with distance from the device is substantially lower; i.e., the effluent temperature remains high for a longer distance.

Moreover, Applicant has discovered that the temperature effect is sensitive to the flow rate of the shield gas, and that, surprisingly, it does not continuously increase with increasing flow rate, but that there is an optimum flow rate. This

effect would not be expected by one skilled in the art. This is illustrated for a particular plasma spray torch using argon shield gas in Example 1 of Applicant's specification.

Surprisingly, Applicant has discovered that by using a gas shield when thermally spraying a high melting material not sensitive to oxidation or nitridation such as ceramic or nonreactive materials such as oxides, but also including nitrides, carbides, and other ceramic and nonreactive materials, that the standoff can be extended without degradation of the microstructure or other properties of the coating. Coatings with a higher density, higher deposition efficiency, higher deposition rate, and more uniform microstructure can be achieved at the extended standoff. These type of coatings would be expected to have greater wear resistance, erosion resistance, higher bond strength, and other desirable properties.

These effects are thought to be due to the increased and extended temperature effect due to the shield on the thermal spray effluent. The efficacy of this discovery is illustrated in Example 2 of Applicant's specification using zirconium oxide. It was shown that the microstructures required for thermal barrier coatings could be obtained at significantly longer standoffs with a shield than without. Moreover, at a given standoff, the microstructures were more uniform, the coatings denser, and the deposition efficiency higher with a shield than without.

Nowhere do the cited references disclose or suggest the use of a shrouding gas in thermal spraying a material not sensitive to oxidation or nitridation, or that the standoff distance can be lengthened without degradation of the microstructure or other properties of the coating, or that the temperature effect described above is sensitive to the flow rate of the shield gas, and that, surprisingly, it does not continuously increase with increasing flow rate, but that there is an optimum flow rate, thereby permitting the application of thermal spray coatings on complex

shapes such as turbine blades and vanes, without degradation of the microstructure or other properties of the coating.

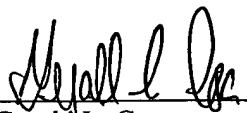
The rejection of claims 1-13, 21 and 22 under 35 U.S.C. 103(a) as being unpatentable over Zurecki et al. (US 5,738,281) in view of Nowotarski et al. (US 5,486,383) and Taylor et al., "Experience with MCrAl and thermal barrier coatings produced via inert gas shrouded plasma deposition" is respectfully traversed.

In view of the amendment of claim 1 and the above arguments, this rejection is deemed improper and should be withdrawn.

It is respectfully submitted that the rejections of record are improper and that the application is in condition for allowance. Accordingly, reconsideration and allowance of all claims are courteously solicited.

A response to the Office Action mailed December 5, 2005 was due March 5, 2006. Accordingly, submitted herewith is a petition for an extension of time for three (3) months. Please charge fees/surcharge which may be required by this paper, or credit any overpayment, to Deposit Account No. 16-2440.

Respectfully submitted,



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